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Basic physics learning process in electrical engineering vocational education program using ispring presenter interactive power-points to improve student understanding

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ABSTRACT

The Department of Vocational Education in Electrical Engineering (JPVTE) is one of the departments based in the Faculty of FKIP UNTIRTA. The physics course at JPVTE is a fundamental concept that must be understood by the first half of students Because students' understanding of physics is still lacking, especially in the idea of mechanics. The research objectives are (1) to Facilitate lecturers in the learning process in the classroom and (2) to improve student understanding in understanding the concepts of mechanics in physics learning. The research method used was descriptive qualitative. The techniques of data collection were observation, tests, and interviews. The analysis technique used is to Determine the percentage of conceptual understanding with a percentage description. The Obtained results are (1) Using the Interactive PowerPoint Point Presenter is very easy for physics lecturers to explain and provide basic concepts of understanding mechanics in interacting with students. (2) Interactive Powerpoint iSpring Presenter can improve students' knowledge in understanding the concept of mechanics included in the high category Because The learning is interactive and fun.

Keywords: learning, PowerPoint, interactive, iSpring presenter, mechanics

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INTRODUCTION

Education is fundamentally a human process that greatly assist in developing itself to face any changes or developments and issues with an open attitude. Teaching and learning is a process of deliberate or created. Sadiman (1996) suggested that a person learns because there taught interactively. In physics, lesson consists of three components, processes, products, and attitude (Himah et al., 2015). Physics as a process because it is a series of activities in a structured and systematic to find the concepts, principles, and laws of natural phenomena. Physics as a product since it is composed of a set of knowledge in the form of facts, ideas, beliefs, and rules of natural wonders. Physics as an attitude, as expected to develop the character of students. Knowledge of physics is essential in the planning of learning physics in college. Rahayu (2015) states that allow students to gain understanding and concepts of physics as a whole should direct to engage students in the learning process in the class-

room actively.

Guntara & Nona (2019) decide research showing that an increase in the ability of the mathematical representation of high school students in physics pedagogy training model of inquiry. In this case, they understand the design or ideas that represent each of the objects, events, and circumstances to facilitate communication between people in thinking. Syuhendri (2010) suggested that the concept stored in mind is called schema. The analogy, this scheme is like files in a file. This scheme will continue to grow and develop as a result of human interaction with the environment. Data are regularly added to the file or repaired as needed. There are two ways to grow and develop this scheme, namely assimilation, and accommodation. Adaptation is the process of combining perceptual cognition how a person with a new concept into the existing system, whereas accommodation, is the making of new schemes or modifications to old projects, which result in changes and developments in schemata. As a result, the need for an independent discovery process so that the knowledge acquired stored as a more meaningful knowledge (Ulya, 2013).

Any understanding of learning physics does not stand alone, but every concept associated with other ideas. All concepts Together form a kind of network of knowledge in the human mind (Iriyanti, 2012). Physics is one of the branches of science. Physics lesson included subjects of interest, but some research Syuhendri (2014), Anderson (2005) and Junglas (2006) (Darmawan et al., 2019), states that students still have difficulty in understanding the concepts of physics that can result in low quality of education. The cause of the lack of understanding of physics concepts such as science education tends to be oriented to test and teachers to teach science as a product that must memorize (Kementrian Pendidikan Nasional Indonesia, 2007).

As for technique, analyze the answers of multiple-choice tests conducted reasoned Calik and Ayas, which combine student choice answers with reasons, resulting in a statement that can be said to be similar answers with the explanation to the problem description. Calik and Ayas unify the category of "no answer / no response" and "do not understand the concept of" into the type of "do not understand the concept of." Thus, the level of student understanding of concepts consists of five categories. Grouping students level of knowledge contained in Table 1 below. Calik and Ayas unify the group of "no answer / no response" and "do not understand the concept of" into the type of "do not understand the concept of." Thus, the level of student understanding of concepts consists of five categories. Grouping students level of knowledge contained in Table 1 below. Calik and Ayas unify the group of "no answer / no response" and "do not understand the concept of" into the category of "do not understand the concept of." Thus, the level of student understanding of concepts consists of five categories—grouping students level of knowledge contained in Table 1.

Table 1. Student Comprehension Level Criteria Based Answer

No	Degree of understanding	Answer criteria
1	Understand the concept (PK)	The answers show the components that fit the concept in full
2	Understand some of the concepts (PS)	The answers indicate one or several components that are in accordance with the concept but are incomplete
3	Understand some concepts with misconceptions (PSM)	The answers indicate an understanding of a concept but accompanied by a statement that contains a misunderstanding
4	Whole misconception (M)	Answers contain illogical or incorrect information.
5	Don't understand the concept (TPK)	Repeating the question, the answer is irrelevant, or not answered

Previous relevant research results Adrianus (2015) conducted a study on student understanding of the concept of thermodynamics, State University of Gorontalo. Research results conclude that understanding the idea of a student at the thermodynamic material is still considered low by obtaining an average score

of student understanding by 6.16%, there is a misconception of 4.32% and did not understand the concept of 89.52%. Pratama (2016) conducted a study to identify the characteristics of the thermodynamic theory of physical education students Kanjuruhan University of Malang. Research results conclude that the students understand the concept correctly is still relatively low by obtaining an average score of 29.68%, while 70.32% have misconceptions. Preliminary study on the subject of research, student education department of physics Unikama, unknown 66.67% do not understand the concept of an ideal gas (Pratiwi, 2016). Based on the above, it is necessary to do more extensive research. Therefore, researchers are trying to research the understanding of students on the material thermodynamic concept by analyzing the knowledge of the idea of students as seen from the answers of students in answering questions. They were using a survey instrument of Thermodynamic Processes and the First and Second Laws (STPFaSL).

Rahmawati, Wiyono & Syuhendri (2017) researched to determine the understanding of concepts, levels, and types of misconceptions student misconceptions in material thermodynamics. The study conducted on Physics Education Study Program Guidance and Counseling University Sriwijawa with 63 research subjects, the student of 2014. Data were collected using instruments Survey of the Thermodynamic Processes and First and Second Laws (STPFaSL). Descriptive qualitative research methods. The results showed. 1) score lower student conceptual understanding that is equal to 27.66%. 2) there is a 7.82% of the students understand the concepts, 27.72% of the students understand the concept of majority, 26.1% of the students understand the concept of partial accompanied by misconceptions, 4, 62% of students misconceptions intact and 33.74% of the students do not understand the idea. 3) students experiencing mistakes on the whole concept tested with 6%. The first law of thermodynamics concepts. 9.5% the second law of thermodynamics concepts, 3% PV diagram of the idea, the idea of a reversible process 1.6%, and 3% the idea of an irreversible process. The implications of this research, faculty need to analyze student understanding of concepts and choose the instructional strategies suitable conceptual changes to improve the knowledge of the ideas and remediate student misconceptions. The results of Samsuni, Saidah & Sadiqin's research (2019), states that the cooperative learning STAND enhances the activity of the current qualifications and learning outcomes with unique requirements and very good.

From the above results, it can conclude that the understanding of concepts in physics learning is needed so that learners can understand more deeply about the physics teaching. So, the difference between the study the researchers did was to use the Interactive Powerpoint iSpring Presenter can improve student understanding PVTE UNTIRTA in learning physics. In this regard has not been effective in the implementation of learning physics in PVTE UNTIRTA because based on observations made by researchers, namely: (1) Not optimal learning in the use of multimedia applications resulting lack of facilities and infrastructure. (2) Not to be understood by the use of interactive multimedia iSpring Presenter Powerpoint so that in learning, lecturer less varied resulting in students less interested in following a physics course in PVTE UNTIRTA. (3) An understanding of student learning is still lacking; in this case, it can see from the achievement of a physics course in material mechanics, are even far from the expected. Therefore, it is better to optimize mastery of learning physics with understanding the concept of mechanics, especially in a physics course, in improving the understanding of student learning.

Lecturers do physics learning using multimedia devices with the hope of motivating the students further, and also facilitate students to remember better, do understand the physics course, especially in the matter of mechanics. The purpose of this study was (1) To promote a lecturer in the learning process in the classroom and (2) To improve the understanding of students in understanding the mechanics of learning physics concepts. Researchers tried to examine more deeply about the above problems concerning physics teaching Vocational

Education Electrical Engineering UNTIRTA use ISpring Presenter Interactive Powerpoint to improve the understanding of the concept of mechanics.

RESEARCH METHODS

The method used in the study is a qualitative method with a descriptive approach so that researchers presented data obtained and analyzed descriptively to gain an understanding of the mechanics of the students PVTE UNTIRTA. The variables measured by the percentage of understanding the concept of mechanics, students PVTE UNTIRTA by analyzing the results of the answers of students to the multiple-choice questions by reasoning is open through tests using instrumental STPFaSL are 33 items that have tested validity and reliability. Thus no need for legality and reliability as the matter generally (Rahmawati, Wiyono & Syuhendri, 2017).

PVTE student research subjects that students 1st semester 2019 class who have attended a physics course. Data collection techniques are ways to obtain empirical data that can use to achieve the research objectives. To know the conceptual understanding of mechanics, then the calculation of the results of the written test. The test result data analyzed by the following steps: (1) Finding the value or the average score of all students answer; (2) Discovering answers to students per item matter of each concept and combines the student answer choices with reason; (3) Also, each student explains per sub concept categorized into five categories of level of understanding of the concept; (4) Calculating the frequency of student answers; (5) Determining the percentage of understanding the idea of using a portion of that descriptive formula (Kamelta, 2011):

$$Percentage = \frac{f}{N} \times 100\% \quad (1)$$

With, *percentage*: percentage of category understanding; f : sum of student in each category understanding; and N : sum of all respondent.

(6) Further data analysis will lead to the conclusion of the study (Rahmawati, Wiyono & Syuhendri, 2017).

RESULTS AND DISCUSSION

In this study conducted in PVTE, UNTIRTA subject semester students 1 class 2019 amounted to 30 respondents. This study was conducted on 1, 8, 15, 22, 29 November 2019. Questions tested are divided into five subconcept for MK physics, namely (1) a straight motion, (2) speed, (3) the acceleration, (4) straight motion irregular, and (5) a uniformly accelerated motion. Of the five sub-concept is carried out with the amount of matter that as many as 33 items. From the results obtained score is the average score of students, PVTE UNTIRTA understanding of the concept is at a deficient category, the average rating of students PVTE UNTIRTA understanding of the idea of 20.98%. These results thus show that the need for a breakthrough in improving the knowledge of the concept depth for students PVTE UNTIRTA.

To further understand the level of student understanding of the mechanics, then analyze the answers and the reasons for the fifth subconcepts PVTE students are using five categories on the level of knowledge of the concept expressed by (Rahmawati, Wiyono & Syuhendri, 2017). The percentage of students conceptual understanding PVTE UNTIRTA on each subconcept of the five categories, which will discuss as follows:

Rectilinear motion

On the concept of straight action is part of the translational motion of an object that is moving without rotating them. Said to be a straight motion because its trajectory is a straight line, for example, can be seen on a motorcycle moving forward, although the movement of the guava fruit that falls from the tree and any object that runs on the straight path. In this study, there were five straight motion about the concept of straight action that is a matter of numbers 1, 6, 11, 16, and 21. The percentage of students understanding of the idea of straight motion can see in Figure 1 below.

In understanding the concept of rectilinear motion, most students do not understand the idea, so that answer to what pickup with a score of 29%. Some students understand most concepts in working on the straight motion with a score of 25%. So using the Interactive

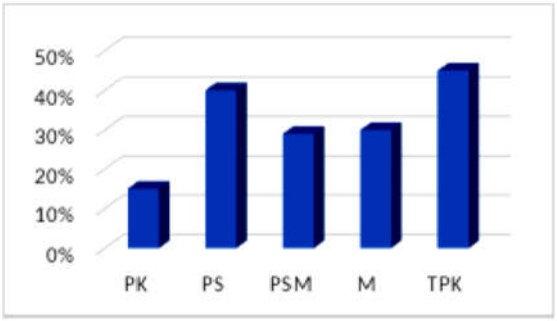

Figure 1. Understanding the concept of straight motion yet using Microsoft Powerpoint Presenter Interactive Inspiring

Powerpoint iSpring Presenter can enhance students' understanding of the idea of mechanics in understanding the concept of straight motion in the high category because learning interactive and fun can see in Figure 2.

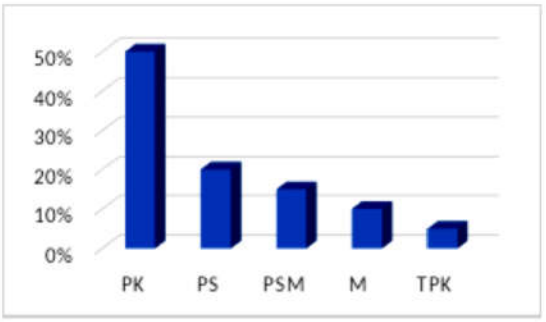

Figure 2. Understanding the concept of straight motion already using Microsoft Powerpoint Presenter Interactive Inspiring

By using Microsoft Powerpoint Presenter, Inspiring Interactive is a software that has been providing facilities to assist in the preparation of an effective presentation, professional, and easy to use. Microsoft Powerpoint Presenter Interactive Inspiring also helps in conveying an idea that becomes more attractive and apparent objectives in the desired learning.

Speed

Speed defined as the change in position per unit time. In the MKS or SI system, the unit of speed is m / sec or m / s. Depending on the magnitude of the time interval used to define the rate. Definition of speed there is a close relationship between time and distance. Price is the ability of muscle or set of muscles to respond to stimuli in the shortest possible time. Another opinion stated that the speed is the ability to move or move out of the body or limbs from one point to another or to grind the same repetitive activities and sustainable in the shortest possible time.

For understanding the concept of speed comprises five about which numbers 2, 7, 12, 17, and number 22, the percentage of students PVTE UNTIRTA understanding of the idea before and after using Microsoft Powerpoint Presenter Interactive Inspiring as shown in Figure 3.

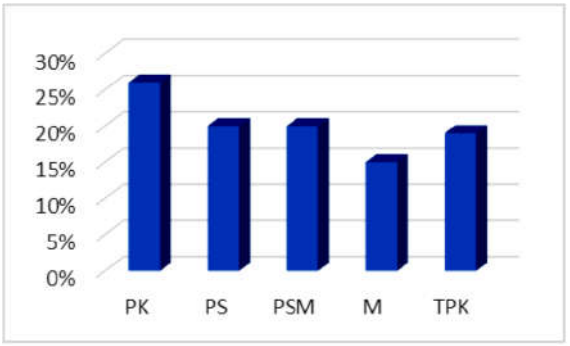

Figure 3. Understanding the concept of speed is not using Microsoft Powerpoint Presenter Interactive Inspiring

From Figure 3 above, PK obtained a score of 26%, with a score of 20% PS, PSM with a score of 20%, M with a score of 15%, while TPK achieves a score of 19%. The results of the students' understanding PVTE UNTIRTA during a lesson by using Microsoft Powerpoint Presenter Interactive Inspiring, as shown in Figure 4.

Acceleration

Acceleration is the change that occurs at a rate within a specified time. In physics, acceleration usually is referred to as a change concerning a speed of travel between the two points (point A to point B). There are six questions of 30 questions about the understanding of the acceleration that is a matter of numbers

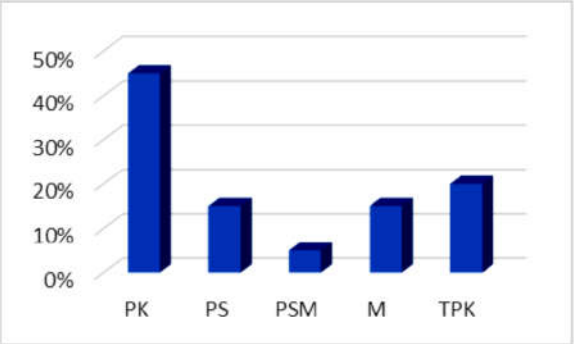

Figure 4. Understanding the concept of speed is already using Microsoft Powerpoint Presenter Interactive Inspiring

3, 8, 13, 18, 23, and 26. As a percentage of the value score of understanding, the concept of acceleration can see in Figures 5 and 6 below.

From the results mentioned above, the percentage can result in the PK with a score of 22%, PS with a score of 19%, PSM with a score of 20%, M with a score of 12%, and TPK with a percentage score 27%.

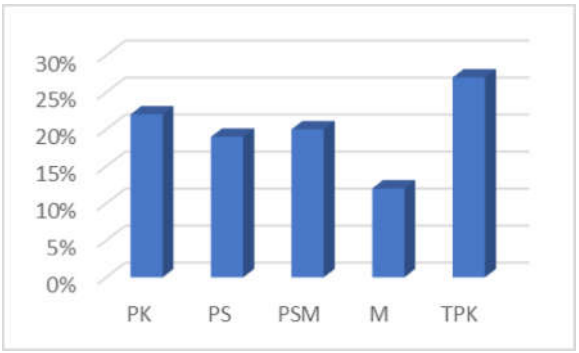

Figure 5. Understanding the concept of acceleration is not using Microsoft Powerpoint Presenter Interactive Inspiring

PVTE student comprehension in understanding the concept of acceleration has increased very dramatically that PK increased scores 60%, PS increased by 15%, PSM with a score of 10%, M with a score of 5%, while TPK reached a score of 10%

Regular Straight Motion (GLB)

An object is said to perform uniform rectilinear motion if the speed is always constant. Constant velocity means high speed and direction alias speed constant speed, because of the high speed and direction alias speed constant speed it can say that the object moves in a straight line at a steady rate. For example, a car

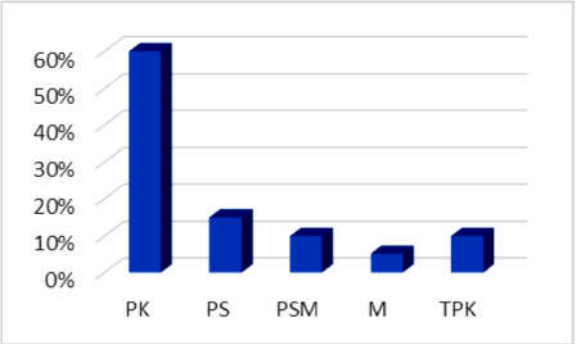

Figure 6. Understanding the concept of acceleration is already using Microsoft Powerpoint Presenter Interactive Inspiring

moving straight eastward at a continuous speed of 10 m/s. Mean that the vehicle is moving straight eastward as far as 10 meters per second. Because of its speed constant, then after 2 seconds, the car is moving straight eastward as far as 20 meters, after 3 seconds of the vehicle is moving straight eastward as far as 30 meters and beyond. Compare it to the picture on the side. Note the magnitude and direction of the arrow. The length of the shaft represents high alias speed velocity, while the course of the arrow represents the direction of speed.

The understanding of the concept of uniform rectilinear motion is composed of six questions that the number 4, 9, 14, 19, 24, and 27. The percentage of that obtained before and after the use of interactive PowerPoint PVTE students can see in Figure 7.

Understanding the concept of uniform rectilinear motion (GLB) consists of six questions that made up about the number 4, 9, 14, 19, 24, and 27. The percentage scores for PK at 20%, 17% PS, PSM reached 21%, M reached

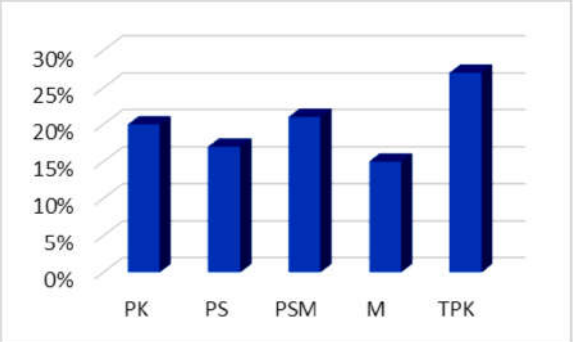

Figure 7. Understanding the concept of GLB yet using Microsoft Powerpoint Presenter Interactive Inspiring

TPK 15% while achieving a score of 27%. The understanding of the concept of GLB is already using interactive PowerPoint in presenting material in class. The percentage score obtained in the delivery of content using an interactive PowerPoint can see in Figure 8.

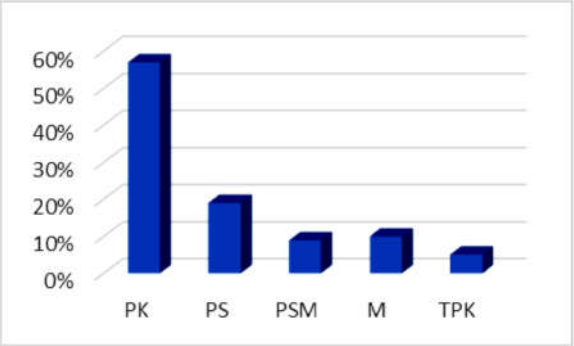

Figure 8. Understanding the concept of GLB already using Microsoft Powerpoint Presenter Interactive Inspiring

In understanding the concept of GLB, students are more interested in attending to the material conveyed by the faculty for using interactive PowerPoint, which equipped with an engaging animation that is not boring in physics teaching. The percentage score obtained is a PK with a score of 57%, PS with a score of 19, PSM with a percentage score of 9%, M with a score of 10% as well as TPK reached a score of 5%. Students working on the problems GLB using a concept according to his understanding of the matter by the orders can do about it.

Straight Motion Irregularly Changed (uniformly accelerated motion)

An object is said to perform a uniformly accelerated action (uniformly accelerated action) if the acceleration is constant. Acceleration is a vector quantity (a quantity that has magnitude and direction). Constant acceleration means the magnitude and direction of the acceleration is consistent all the time. Although the acceleration of an object is always steady, if the course of the acceleration is ever -changing, the acceleration of the object is not constant. Vice versa, if the direction of the acceleration of an object is always constant acceleration, but big forever change, the acceleration of the object is not constant since the course of the acceleration of the object is steady. The objective is moving on a straight path. Instructions acceleration constant = constant speed toward the direction of movement of objects = consistent = direction of motion of the object does not change = moving objects straight. Significant constant acceleration could mean a continuous speed increases or decreases the speed constant. When the rate of the purpose continuously reduced, sometimes we call it a consistent deceleration. For one-dimensional motion (motion in a straight line), said acceleration used when the direction of velocity = direction of acceleration, deceleration. In contrast, the word used when the opposite direction of the speed and acceleration.

The amount of matter in the understanding of 8 uniformly accelerated motion no matter comprising about numbers 5, 10, 15, 20, 25, 28, 29, and 30. As a matter of numbers percentage score obtained before using interactive PowerPoint is a PK with a score of 21%, PS with a score of 15%, PSM with a score of 15 M with a score of 20 and TPK with a score of 29%. As for the presentation of data as in Figure 9.

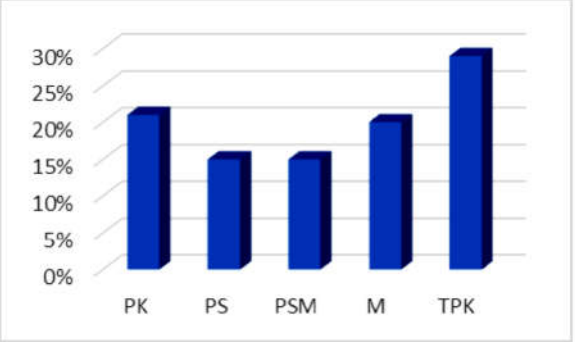

Figure 9. Understanding the concept of uniformly accelerated motion is not yet using Microsoft Powerpoint Presenter Interactive Inspiring

The percentage of students knowledge of the idea of uniformly accelerated motion after using Microsoft Powerpoint Presenter Interactive Inspiring. PK at 62%, with a score of 15% PS, PSM with a score of 4%, M with a score of 8%, and TPK with a score of 11%. The presentation of the data can see in Figure 10.

After the interactive PowerPoint used in teaching physics at PVTE, department can use

it as a medium that is suitable for use in teaching physics. The study states that the interactive PowerPoint presenter inspiring can improve student understanding in the following study PVTE physics.

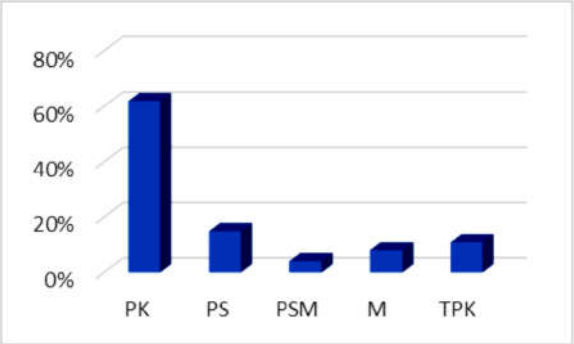

Figure 10. Understanding the concept of uniformly accelerated motion already using Microsoft Powerpoint Presenter Interactive Inspiring

CONCLUSION

By using the Interactive Powerpoint iSpring Presenter is very easy for faculty of physics to explain and provide the basis for understanding the concept of mechanics in interacting with students. Interactive Powerpoint iSpring Presenter can enhance students' understanding of the mechanics in understanding the concepts included in the high category because learning interactive and fun.

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